

REMARKS

Claims 1 through 17, and 21 through 51 are pending in this application. Claims 1, 2, 10, 11, 22, 23, 25, 28, 29, 34, 35, 42 and 44 through 46 are amended in several particulars for purposes of clarity in accordance with current Office policy, to assist the examiner and to expedite compact prosecution of this application. Claims 49 through 51 have been newly added. The Applicant appreciates the Examiner's indication of allowability concerning claims 3, 39 through 41 and 35 through 37, 44 through 46 and 48.

I. Claim Rejections - 35 USC § 112 (first paragraph)

The Examiner stated that Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The Examiner further stated that he realizes that he agreed that the amendment was supported by the original specification, however, upon further review of the specification the Examiner was unable to find such support and that the Applicant is invited to point out where in the specification such a range (20 to less than 70 microns) is taught and if the Examiner agrees that the range is disclosed, the rejection will be withdrawn.

Concerning claim 4, the amended claim 4 is not anticipated by Yamauchi. As mentioned and agreed to in the interview of 13 April 2004, the Amendment to claim 4 is supported by the specification, specifically paragraph 33, second and third sentences, disclose "As the density of an

electron emissive layer increases, carbonate tends to come off. However, in the present invention, when the thickness T of an electron emissive layer 110 is less than about 70 μm (micrometers or microns), this problem does not occur.” (emphasis added) Therefore, the electron emissive layer being less than 70 microns is supported by the specification. Further in paragraph 33, last sentence, it also states “When the thickness of the electron emissive layer is less than 20 microns, the carbonate is not sufficient, which decreases the electron emission due to evaporation of Ba, while, when the thickness is over 70 microns, thermal transmission to the emitter can not be accomplished successfully, which causes decomposition of cathode.” Therefore, the problems with being less than 20 microns and more than 70 microns are given along with the benefits of avoiding a problem at less than 70 microns is also given which teaches the *range of the thickness of the electron emissive material layer being from 20 to less than 70 microns* as claimed in claim 4.

Therefore, since Yamauchi discloses an electron emissive layer of 70 microns, claim 4 of the present invention is not anticipated.

II. Claim Rejections - 35 USC § 112 (second paragraph)

The Examiner stated that Claims 5, 7, 8, 9, and 22, are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention and that Claims 5, 7, 8, 9, and 22 recite a "group consisting essentially of." The Examiner further states that the transitional phrase, "consisting essentially of," is open ended and therefor it is unclear what is included in the respective groups.

Respectfully, this is a well known acceptable use of consisting essentially of in terms of being selected from a group. In fact, 3,242 patents issued by United States and Patent Office use the exact phrase “group consisting essentially of” and 2,092 patents from USPTO have the phrase “selected from the group consisting essentially of” in the claims since 1976. Therefore, claims 5, 7, 8, 9, and 22, should not be rejected under 35 U.S.C. 112, second paragraph.

III. Claim Rejections - 35 USC § 102/103

No claim is anticipated under 35 U.S.C. §102 (b) unless all of the elements are found in exactly the same situation and united in the same way in a single prior art reference. As mentioned in the **MPEP §2131**, “a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Every element must be literally present, arranged as in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (CAFC 1989). The identical invention must be shown in as complete detail as is contained in the patent claim. *Id.*, “All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 165 USPQ 494, 496 (CCPA 1970), and MPEP 2143.03.

According to MPEP 706.02(j), the following establishes a *prima facie* case of obviousness

under 35 U.S.C. §103:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

A. Claims 1-2, 4-6, 33-34, and 42-43 are rejected under 35 U.S.C. 102(e) as being anticipated by and alternatively under 35 U.S.C. 103(a) as being obvious over Yamauchi et al. (US 6,351,061). The Applicant respectfully traverses.

1. Regarding claims 1-2, the Examiner stated that:

Yamauchi teaches a cathode comprising a base metal 2 and an electron emissive material layer 3 attached on the base metal 2 (Fig. 1). Yamauchi teaches that the electron emissive material layer 3 includes a surface roughness measured from a distance between a highest point and a lower point of the surface of the electron emissive material layer being at most 15 microns (col. 5, lines 15-19). This range includes the range of not more than 5 microns. Yamauchi further teaches that if the difference between the highest and lowest point is 10 microns or less that an even better current density distribution can be obtained, anticipating that a cathode having a smaller surface roughness would exhibit even better current density distribution (col. 5, lines 20-22).

The Examiner also stated that since the Yamauchi reference teaches that a difference between the highest and lowest point of not more than 10 microns provides a cathode having a better current density distribution than one having a surface roughness of not more than 15 microns, one of ordinary skill in the art would have found it obvious to provide a surface roughness less than not more than 10 microns (including not more than 8 and not more than 5 microns).

However, first of all, there can be no anticipation under 35USC§102 since the Examiner admits there is no specific examples falling within the claimed ranges in Yamauchi. MPEP §2131.02. The Examiner mentions that 10 microns is even better according to Yamauchi than 15 microns. However, 10 microns is still not “not more than” 8 or 5 microns. *In re Schauman* or *Ex parte Lee*, 31 USPQ2d 1105 (Bd. Pat. App. & Inter. 1993) (expanded Board), cited in MPEP 2131.03 did not intend this to be criterions of proving sufficient specificity. Furthermore, other decisions on appeal before the Board of Patent Appeals and Interferences also show that a specific value within the range must be shown and not just a teaching that may or may not lead to a value.

(Appeal No. 1999-0404 and Appeal No. 96-3717). In fact on page 19 of Appeal No. 1999-0404, the Board stated that “Chiang does not disclose any one value falling within the range set forth in either claim 2 or 3. Moreover, it is our view that a value falling within the range set forth in claim 2 or claim 3 is not set forth in Chiang with ‘sufficient specificity’ to constitute anticipation.” Furthermore on page 9 of Appeal No. 96-3717, the Board also states, “Lambert does not specifically disclose a range of less than 5 wt% nor does Lambert give an example having a value of less than 5wt%. For this reason alone, we cannot sustain the examiner’s rejection of claims 12, 13, 16-22 and 25-30 under 35USC§102(b) as anticipated by Lambert.” For anticipation, an actual value within the claimed range must actually be disclosed in the reference and not just an extrapolation of a value. Therefore, Yamauchi does not anticipate the present invention.

Therefore, turning to a 35USC§103 rejection, the Examiner states that the Yamauchi reference teaches that a difference between the highest and lowest point of not more than 10 microns provides a cathode having a better current density distribution than one having a surface roughness of not more than 15 microns, and therefore one of ordinary skill in the art would have found it obvious to provide a surface roughness less than not more than 10 microns (including not more than 8 and not more than 5 microns).

According to MPEP §2144.05 Obviousness of Ranges, “Applicants can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range.” On the record, the application mentions the *criticalness* of a surface roughness less than or equal to

8 microns and 5 microns throughout the specification. For example, the specification mentions that the present invention markedly increases the lifespan of the cathode. There is also a decrease in evaporation of barium and a decrease in a cut-off drift rate, increasing beam spot, eliminating the moire phenomenon, *etc.*, and as mentioned in paragraph 56, such improvements are connected with the reduced surface roughness. Therefore, since the criticality of the narrower range is given in the specification, the range is not obvious.

Moreover, in a 103 rejection, the Examiner must look at the entire prior art, including anything that may teach away from the present invention. Yamauchi may state that not more than 10 microns is better than 15 microns, but Yamauchi also shows on col. 5, lines 40-45 a serious concern about the decrease in adhesive force when the electron-emitting surface is flattened. On col. 5, lines 40-59, the maximum roughness on the electron emissive layer is much higher than. Therefore, it is not obvious from Yamauchi that a lower range of not more than 8 or not more than 5 is taught or suggested.

Furthermore, the actual maximum roughness in all of Yamauchi is never disclosed, taught or suggested to be not more than 8 or 5 as claimed in the present invention. Yamauchi only discloses a maximum roughness of 10 and claims only 15.

2. Regarding claim 4, the Examiner stated that:

Yamauchi teaches that the thickness of the electron emissive material layer is 70 microns (col. 4, lines 45-49) and that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3 % molybdenum, up to 0.1 % iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.).

As mentioned above, the claim 4 states the range being less than 70 microns and not at 70 microns, and therefore, Yamauchi fails to teach or suggest less than 70 microns. Furthermore, not only does Yamauchi fail to teach or suggest less than 70, Yamauchi also fails to teach the thickness of the electron emissive material layer being from 20 to less than 70 microns. If the Examiner is stating that it is obvious that less than 70 is taught, then there must be a motivation in Yamauchi to modify it being less than 70 microns and without that suggestion, Yamauchi cannot make claim 4 obvious. The case cited by the Examiner, *Titanium Metals Corp. of America v. Banner* does not state anything that is contrary to this procedure mandated by MPEP 706.02(j).

Looking closely at *Titanium Metals Corp. of America v. Banner*, on page 779, the court stated that one skilled in the art would have expected the same properties with the close proportions of alloys, but as already mentioned above, the present invention on the record states on paragraph 33 that as the density of an electron emissive layer increases, carbonate tends to come off, however, in the present invention, when the thickness T of an electron emissive layer 110 is less than about 70 μm (micrometers or microns), this problem does not occur. Therefore, *Titanium Metals Corp. of America v. Banner* is not relevant to the present case as the properties are not similar.

3. Regarding claim 5, the Examiner notes that :

...the claim limitation that "the electron emissive material layer being attached on said base metal by one method selected from the group consisting essentially of printing and deposition" is drawn to a process of manufacturing which is incidental to the claimed apparatus. In spite of the fact that a product-by-process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does not rest merely on the difference in the method by which the product is made. Rather, is the product itself which must be new and not obvious. It is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113). Therefore, it is the position of the examiner that it would have been obvious to one of ordinary skill in the art that the electron emissive material layer disclosed by Yamauchi is at least a fully functional equivalent to the Applicant's claimed electron emissive material layer as evidenced by Yamauchi's suggestion of all of the Applicant's claimed structural limitations.

Moreover, regarding claim 6, the Examiner notes that

...the claim limitation that "the electron emissive material layer being attached on said base metal by a screen printing method " is drawn to a process of manufacturing which is incidental to the claimed apparatus. In spite of the fact that a product-by-process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does not rest merely on the difference in the method by which the product is made. Rather, is the product itself which must be new and not obvious. It is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113). Therefore, it is the position of the examiner that it would have been obvious to one of ordinary skill in the an that the electron emissive material layer disclosed by Yamauchi is at least a fully functional equivalent to the Applicant's claimed electron emissive material layer as evidenced by Yamauchi's suggestion of all of the Applicant's claimed structural limitations.

The Applicant contends, however, according to MPEP §2113, the process steps do in fact

imply a structure. A different structure is imparted, in that Yamauchi does not teach or suggest of controlling the maximum surface roughness to be below 10 microns, while the present invention can. Just because Yamauchi states that a maximum of 10 microns is better than a maximum of 15 microns, but that does not teach a maximum of 8 and 5, especially since there is a concern about reduced roughness in Yamauchi as mentioned above.

4. Regarding claim 33, the Examiner stated that Yamauchi teaches the oxide particles having a uniform size (see for example col. 1, lines 24-36) and regarding claim 47, the Examiner stated that Yamauchi teaches the emissive material layer having a uniform size of pores between oxide particles having a uniform size (see for example col. 1, lines 24-36)..

However, looking at col. 1, lines 24-36 of Yamauchi only state that there is homogenous porosity and therefore, homogeneous porosity does not necessarily mean that the oxide particles have uniform size because a ratio of the volume of the material's pores with the volume of the material being homogenous does not disclose or teach or suggest the actual oxide particles having a uniform size. Col. 1, lines 24-36 goes on to indicate a maximum average particle size, but again this does not indicate oxide particles having a uniform size but only a measurement of the average size.

Furthermore, col. 1, lines 24-36 is from the conventional oxide and not the actual Yamada invention.

5. Regarding claim 34, the Examiner stated that Yamauchi teaches the emissive material layer having a uniform size of pores between the particles (see for example col. 1, lines 24-36).

However, claim 34 as amended teaches pores between the oxide particles being no greater than 8 microns, and such is not taught or suggested by Yamauchi.

B. Claims 21-32 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al. (PCT publication WO00/59178) in view of Yamauchi et al. (US 6,351,061). Please note that US Patent 6,376,976 is used as translation of WO99/59178. The Applicant respectfully traverses.

1. Regarding claims 21, 24, and 29-31, the Examiner stated that Saitoh teaches a cathode with an electron emissive material comprising a paste that includes a carbonate powder, a solvent and a binder mixed with the powder and solvent (see for example col. 6, lines 29-39) and the following:

Saitoh does not specifically teach the ranges of each of the components of the paste, however it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide appropriate ranges for the composition by weight of the carbonate powder, the solvent, and the binder since optimization of workable ranges is considered within the skill of the art.

Saitoh does not specifically teach the electron emissive material layer includes a surface roughness measured from a distance between a highest point and a lower point of the surface of the electron emissive material layer being at not more than 8 microns

However, Yamauchi teaches a method including spraying the emissive material on the base metal (2) followed by a step of compressing the surface so that the electron emissive material layer 3 includes a more compact, flattened surface having a surface

roughness measured from a distance between a highest point and a lower point of the surface of the electron emissive material layer being at most 15 microns (see for example col. 5, lines 15-19). This range includes the range of not more than 5 microns. Yamauchi further teaches that if the difference between the highest and lowest point is 10 microns or less that an even better current density distribution can be obtained, anticipating that a cathode having a smaller surface roughness would exhibit even better current density distribution (see for example col. 5, lines 20-22).

Since the Yamauchi reference teaches that a difference between the highest and lowest point of not more than 10 microns provides a cathode having a better current density distribution than one having a surface roughness of not more than 15 microns, one of ordinary skill in the art would have found it obvious to provide a surface roughness less than not more than 10 microns (including not more than 8 microns).

The Examiner notes that the claim limitation that the paste is printed on the base metal is drawn to a process of manufacturing which is incidental to the claimed apparatus. In spite of the fact that a product-by-process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does not rest merely on the difference in the method by which the product is made. Rather, is the product itself which must be new and not obvious. It is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113). Therefore, it is the position of the examiner that it would have been obvious to one of ordinary skill in the art that the electron emissive material layer disclosed by Saitoh in view of Yamauchi is at least a fully functional equivalent to the Applicant's claimed electron emissive material layer as evidenced by Saitoh and Yamauchi's suggestion of all of the Applicant's claimed structural limitations.

The Examiner states that Saitoh does not specifically teach the ranges of each of the components of the paste and therefore, under MPEP 706.02(j), all of the limitations are not taught or suggested. Furthermore, the Examiner fails to show any suggestion or motivation to modify Saitoh or Yamauchi to teach or suggest the claimed elements.

The Examiner only goes on to state that it has been held that where the general conditions

of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. The Examiner goes on to state that it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide appropriate ranges for the composition by weight of the carbonate powder, the solvent, and the binder since optimization of workable ranges is considered within the skill of the art.

Respectfully, this is clearly an improper application of the law. It is clear that prior art reference (or references when combined) must teach or suggest all the claim limitations under a 35USC§103 rejection. To merely state as proof of a rejection that the general conditions of a claim are disclosed in the prior art is quite ambiguous and does not pertain to actual limitations.

Furthermore, according to MPEP 2144.05 states that a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

Here, clearly, the Examiner has failed to prove that the claimed ranges are a result-effective variables as disclosed in the references cited.

Moreover, the prior art of Saitoh and Yammauchi did not optimize or suggest to optimize the parameters that the Examiner claims were optimized by the present invention. *In re Antione*, 559 F. 2d 618, 195 USPQ 6, 8 (CCPA 1977).

2. Regarding claims 22 and 25, the Examiner stated that Saitoh teaches the solvent being terpinol (see for example col. 6, line 36).

However, Saitoh recites terpineol and not terpinol as claimed. Terpineol is any of three isomeric alcohols, $C_{10}H_{17}OH$, occurring naturally in the essential oils of certain plants and used as solvents and terpinol is any oil substance having a hyacinthine odor, obtained by the action of acids on terpin, and regarded as a related hydrate.

Moreover, as amended, claim 22 includes the combination of terpinol with butyl carbitol acetate which is not taught or suggested by the combination of references. Furthermore, in the amended claim 25, 30 to 50% terpinol is also not taught or suggested by the references.

3. Regarding claims 26-27 and 32, the Examiner stated that Saitoh and Yamauchi do not specifically teach the solvent being butyl carbitol acetate. However, the Examiner stated that it is noted that the applicant's specific type of solvent, does not solve any of the stated problems or yield any unexpected result that is not within the scope of the teachings applied and it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. Thus, the examiner states that it would have been obvious to one having ordinary skills in the art at the time the invention was made to have

used any suitable solvent (terpinol, butyl carbitol acetate, a combination thereof, etc.) since the selection of known materials for a known purpose is within the skill of the art.

Respectfully, it is settled patent law that the Examiner's statement that a modification of a reference under 35 U.S.C. §103 would be a "design choice" is a conclusion rather than a reason for rejecting a claim under 35 U.S.C. §103. The fact of the matter is that Examiner has failed to prove that Saitoh and Yamauchi teaches or suggest the solvent being butyl carbitol acetate and therefore, is not obvious.

Furthermore, concerning a statement that an unexpected result must be shown is improper when the Examiner cannot even show the combination shows such an element. Unexpected result is need under certain circumstances, as pointed out specifically in the MPEP like overlapping ranges, etc. but in this instance where the Examiner has failed to even provide a *prima facie* case.

Furthermore, the Examiner's statement that the selection of known materials for a known purpose is within the skill of the art is a statement based on the Examiner's knowledge and as such, the Examiner is asked to provide a reference supporting his statement that can be properly motivate a modification of the above references or an affidavit stating that such is common knowledge.

4. Regarding claim 38, the Examiner stated that:

Saitoh does not specifically teach the carbonate powder having a size of 5 to 7 microns being separately distributed without aggregation. However, Yamauchi teaches the carbonate powder having a size of 5 microns allows for a suitable planarity of the

surface of the emissive material layer while at the same time leaving the emissive material layer with favorable crevices in its surface (see for example col. 5, lines 7-14). Accordingly, one of ordinary skill in the art would have found it obvious at the time the invention was made to make the particles of the carbonate powder 5 microns so as to allow for the surface to be flattened and at the same time comprise favorable crevices in its surface so as to provide a cathode having an exceptional current density distribution along with the ability to produce a desired electron emission. The particles are separately distributed without aggregation (see for example fig. 1b).

The Examiner claims that figure 1b of Yamauchi teaches or suggest *separately distributed without aggregation*, however 1b clearly shows an aggregation of the particles in certain locations.

IV. Rejoinder of Withdrawn Claims

Concerning withdrawn claim 10-17, according to MPEP §821.04 in the *In re Ochiai* rejoinder, when there is even a proper restriction between product and process claims and when the product claims are elected, and the product claims are allowable, the process claims that include all the limitations of the allowable product claims would also be allowable.

Withdrawn Claim 10 has been amended to include the limitations of the product claim 1 and claim 11 has been amended to include the limitations of the product claim 2. Therefore, when claims 1 and 2 are allowed, claims 10-17 must be rejoined.

Furthermore, newly added claims 50 and 51 that are dependent on claim 10 and already include allowable subject matter and therefore under MPEP §821.04 must now be considered and should be allowable.

V. Allowable Subject Matter

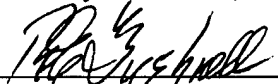
The Examiner stated that Claims 35-37, 44-46, and 48 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The applicant appreciates the examiner's indication of allowability pertaining to claims 35-37, 44-46, and 48. Claims 35 and 44-46 were amended according to the Examiner's suggestion, and therefore, claims 35-37, 44-46, and 48 should be allowed.

In view of the foregoing amendments and remarks, all claims are deemed to be allowable and this application is believed to be in condition to be passed to issue. If there are any questions, the examiner is asked to contact the applicant's attorney.

A fee of \$406.00 is incurred by this Amendment for the addition of four (4) independent claims above four (4), and for the addition of three (3) claims above forty-five (45). Applicant's check drawn to the order of Commissioner accompanies this Amendment. Should there be a deficiency in payment, or should other fees be incurred, the Commissioner is authorized to charge Deposit Account No. 02-4943 of Applicant's undersigned attorney in the amount of such fees.

Respectfully submitted,



Robert E. Bushnell
Attorney for the Applicant
Registration No.: 27,774

1522 "K" Street N.W., Suite 300
Washington, D.C. 20005
(202) 408-9040

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